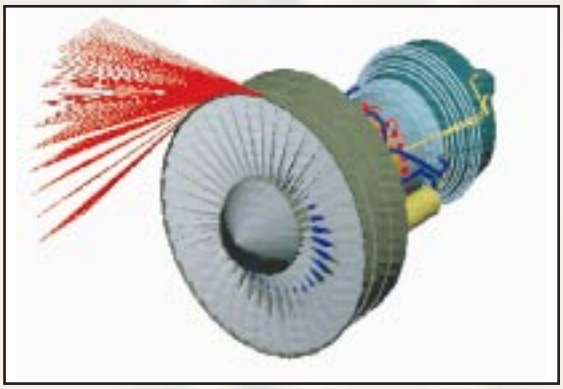
Aircraft Catastrophic Failure Prevention Program

The FAA forecasts that U.S. carriers alone will carry 1.2 billion passengers by the year 2015. This will occur with a 40 percent increase in the number of flights.

If the current accident rate remains unchanged, some experts predict accidents resulting in numerous fatalities and an aircraft hull loss occurring as frequently as every 7 to 10 days. This potential is the primary driver behind the need to reduce the accident rate toward the zero accident goal. The Aircraft Catastrophic Failure Prevention Program is working to make sure this prediction does not become reality.

The Aircraft Catastrophic Failure Prevention Program was created by Congress in 1990 (Public Law 101-508) with the intended goal of improving aircraft system safety by developing technologies and methods that will assess the risk and prevent defects, failures, and malfunctions of aircraft, aircraft components, and aircraft systems which could result in catastrophic failure of aircraft. The Aircraft Catastrophic Failure Prevention Program focuses principally on mitigating the hazards associated with propulsion, flight control, and structural failures that occur during operation. Priorities for research are set by using historical accident data and National Transportation Safety Board (NTSB) recommendations to identify areas for research:

- Turbine engine uncontainment events including mitigation and modeling of uncontainment and the aircraft vulnerability to uncontainment. This research area was identified as the top priority by the Aerospace Industries Association Continued Airworthiness Assessment Methodologies report and is responsive to NTSB recommendations A-72-006, A-82-38, A-84-060, A-90-170, and A-90-169.



- Developing alternate means of controlling an aircraft when the primary flight control system is damaged or degraded. This research area addresses the DC-10 crash at Sioux City and the JAL crash where flight controls were damaged as a secondary result of a component failure. This research is responsive to NTSB recommendation A-90-169.

- Examining the issues associated with inappropriate crew response to propulsion malfunctions and working with industry to develop solutions to this critical problem. This research area was identified as the second priority by the Aerospace Industries Association Continued Airworthiness Assessment Methodologies report and is responsive to NTSB recommendations A-79-105, A-87-009, and A-95-098.

FAA engineers are working with industry to update Advisory Circular 20-128 “Design Precautions for Minimizing Hazards to Aircraft From Uncontained Turbine Engine and Auxiliary Power Unit Rotor Failures” and to develop a calibrated design system which will be used to minimize hazardous effects of turbine engine (including auxiliary power unit) rotor failures on transport

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aircraft. This effort, involving specialists from the FAA, military, industry, and national laboratories, is targeted for completion in the year 2000.

Working in conjunction with NASA, the FAA will develop an integrated system, demonstrated by flight tests and simulator tests, consisting of a self-repairing flight control system and propulsion controlled aircraft technologies that will allow continued safe flight and landing of a transport aircraft with damage, failures, or malfunctions which can be more extensive than envisioned by the current regulations. Certification guidelines and regulatory material will also be provided.

Again, working with industry and the Aerospace Industries Association Transport Committee on Propulsion System Malfunction Plus Inappropriate Crew Response, the FAA will develop improved training methods and an engine failure warning system that will be used to decrease the incidence of inappropriate crew response to propulsion related problems. Additionally, a technical report will form the basis for new regulations for an engine failure warning system as well as advisory circular material.

Future work also includes the development of appropriate modeling techniques and necessary guidance material to develop Advisory Circular (AC20-XX) to predict the effects on aircraft structure, system, and flight crew from an imbalanced engine caused by loss of a fan blade or blades or a bearing failure.

The Aircraft Catastrophic Failure Prevention Program will introduce technologies and design procedures that will reduce the number of catastrophic accidents. By using enhanced computational capabilities and vulnerability analysis techniques, it will provide technologies and certification criteria to increase the survivability of transport aircraft with extensive failures, malfunctions, or damage.

To find out more about the Aircraft Catastrophic Failure Prevention Program, contact:

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